The following document is a Class 4 QAPP. Typically a Class 4 QAPP can be written for a study that is totally internal, less than 1 year in duration OR covers only 1 or 2 analytes. Please see Page17-18 of the SCDHEC Guidance Document for Preparing QAPPs for Environmental Monitoring Projects/Studies (Rev 1, Oct 2007) for more information.

A. Project Management

A1. Title Page

Edisto River Basin Study

Prepared by Ben Buchanan
January 2008

Comment: This is an example only, not all information concerns Mr. Buchanan's actual study.

Project Manager: Tabatha Corley, Manager
Water Quality Section

Lead Organization: Department of Health and Environmental Control
Region 5-Aiken Environmental Quality Control
206 Beaufort Street NE,
Aiken, SC 29801
(803) 641-7670

Project Location: Edisto River Basin

Project Manager: _____ Date:_____
Tabatha Corley

Region 5 Director: _____Date:_____
Richard Caldwell

BOW: _____ Date:_____
Carol Copeland, Watershed Manager

_____Date:_____
David Graves, Aquatic Biology Section Manager

ARESD Director _____Date:_____
Sandra Flemming

OA Office: _____Date:_____
Nydia Burdick, Manager

Comment: This is an updateable Table of Contents. To update click on the table and hit F9. You may choose to update the pages or the entire table. In order to add items to this table, you must view the outline toolbar. Then highlight the item you wish to add and select Level 1, 2, or 3. Then you must update the table as above and choose update the entire table in order to see the new item.

A2. Table of Contents – Not required for a Class 4

A3 Distribution List

Comment: In this table there should be anyone involved with the QAPP- regional directors, project manager, field manager, QA Office, watershed manager, Ambient Water Staff-Dave Graves, Bill McDermott-Water Quality Monitoring Section, ARESD Director-Sandra Flemming, and Regional Lab Managers that are analyzing/transporting samples. All of the staff listed in the Distribution List receive the QAP and any updates/changes to the QAPP.

Name	Region/Office	Phone	Fax
Tabatha Corley	Region 5 Aiken	803-641-7670	803-641-7675
Rick Caldwell	Region 5 Aiken	803-641-7670	803-641-7675
Carol Copeland	BOW	803-898-4203	803-898-4117
Nydia Burdick	OQA- Columbia	803-896-0862	803-896-0850
Sandra Flemming	ARESD	803-896-0856	803-896-0868
David Graves	BOW	803-898-4398	803-8984200
Bill McDermott	BOW	803-898-4401	803-8984200
Meredith Murphy	BOW	803-898-4222	803-898-4140
Harry Mathis	Region 3 Columbia/Lancaster	803-896-0620	803-896-0617
Christine-Sanford Coker	Reg 7/Chas Regional Director	843-953-0150	843-953-0151
Sharon Gilbert	Reg 7/Chas Lab Manager	843-953-0150	843-953-0151

Table 1 Distribution List

A4 Project/Task Organization

Comment: Anyone in a major role in the project must be listed and their role defined. The person who maintains the QAPP must be identified.

Tabatha Corley- is the Project Manager. In addition, Ms. Corley will analyze microbiological samples and will be the Data Verifier for this project.

Ben Buchanan – Will develop and maintain the QAPP. Mr. Buchanan will be the Field Manager/Investigator.

Greg Mason – Will assist in QAPP Development and as a Field Investigator.

Brant Anderson – Region Laboratory will analyze chemistry samples for those parameters done in the Regional Lab.

Bill McDermott– is the Data Validator for this project.

Kim Newell - GIS Maps. Will provide GIS Locations of the sampling sites and will provide all project maps with sampling sites clearly identified.

Carol Copeland – Will provide expertise from the BOW Program.

Nydia Burdick – Will review and approve the QAPP.

Region 5 Field Investigators- will survey the basin, determine sampling sites, and collect all samples. ***Comment: Notice that the individuals were not listed. If only one or two people are specifically going to do this, then it may be decided that a QAPP needs to go to them both. For this project there is a field manager, who may choose to give them a QAPP, parts of the QAPP that pertain to them, or verbally give instructions.***

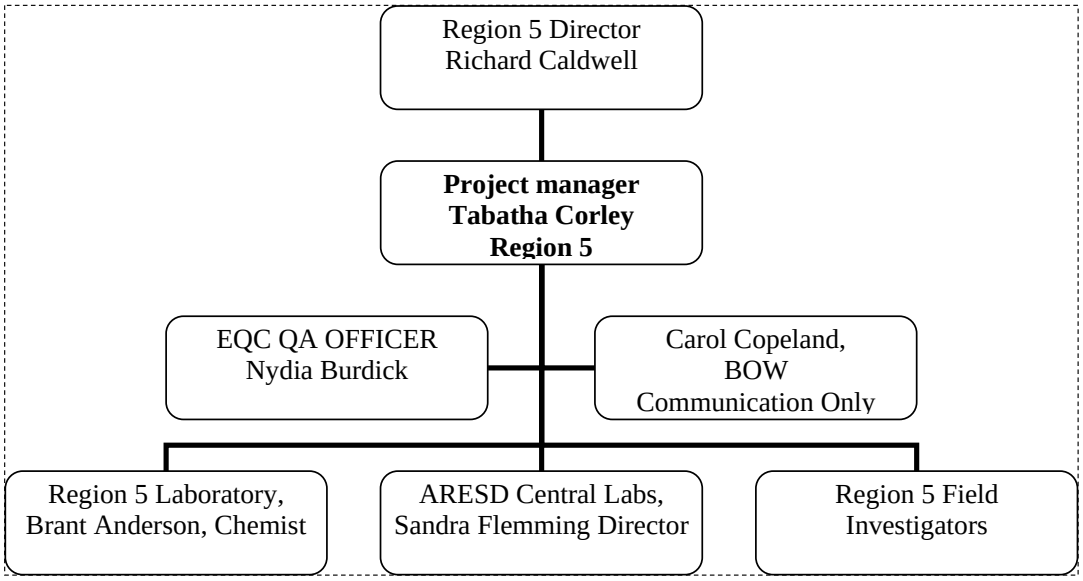

Figure 1 Project Organization Chart

Comment- The chart above can easily be changed by clicking in the boxes. If more boxes are needed, refer to the help section of MS Word under organization charts.

A5. Problem Definition/Background

Explain why the study is being done, the historical background, the regs involved, and what decisions or actions may come out of this study.

The Edisto River Basin contains the longest free-flowing black water river in America. The Basin stands as a unique asset to the State of South Carolina, due to its valuable ecological, economic, recreational, and cultural resources. The Edisto River starts in Edgefield and Saluda Counties (South Fork) and Lexington County (North Fork) and merges into one stream body in Orangeburg County flowing through Dorchester, Colleton, and Charleston Counties before reaching the Atlantic Ocean. The most significant threat to water quality within the Edisto River Basin is non-

point source pollution. The Edisto River Basin is on the 303(d) List for the following impairments, varying for different parts of the basin: pH, fecal coliform bacteria, mercury, dissolved oxygen, copper, ammonia, and turbidity. In most cases, the exact source of the impairment remains unclear. Such identification would facilitate corrective actions, aiding in the implementation of the State's Anti-degradation Policy as part of S.C. Regulation 61-68. Attainment of State water quality standards will serve the interests of the State of South Carolina. The purpose of this project is to locate possible non-point sources of pollution and then determine the extent that each source contributes to the impairment of the water quality.

Emphasis will be placed on the four major river systems that drain the Edisto River Basin. These four systems include: the South Fork Edisto, the North Fork Edisto, Four Hole Swamp, and the main stem of the Edisto River. However, because this River Basin extends into several EQC Regions, the project will be done in a stepwise manner by sub-watershed. This will take place within EQC Region 5, EQC Region 3 (Columbia) and EQC Region 7. The portion done by EQC Region 5 in Aiken will be addressed within this QAPP. EQC Region 3 and Region 7 portions of the project will be addressed in an addendum to this QAPP.

A6. Project/Task Description

Summarize what is to be done in the project, include the measurements that will be made (field and lab, approximate work schedules, detail where the study will take place-includes maps, and if there are any time or resource problems (personnel, weather, money—are examples).

As stated previously, the purpose of this proposed project is to identify problem areas as well as their probable sources and to bolster existing knowledge concerning the Edisto River Basin's ambient water quality baseline. Visual surveys were conducted prior to the beginning of the Project to identify any illegal or un-permitted discharges, any agricultural area of concern, and any construction/land clearing within the Edisto River Basin. The Visual Survey and 303(d) List were used as a basis for targeting and establishing Sampling locations were determined according to the visual survey results and sampling locations. From this the Project team determined that 8 sites (see Figure 1) would be included in this portion of the study and that sites would be sampled monthly.

Figure 2 Map of Sampling Sites (This would be the map where the sampling sites would be shown.)

The following table gives Project activities and their anticipated date of initiation and completion.

Activity	Name/Group	Anticipated date of initiation	Anticipated Date of Completion	Comments
Visual Reconnaissance	Ben Buchanan	11/1/07	11/15/07	
Site Determination	Ben Buchanan	11/16/07	11/20/07	
GPS Training	Jeannie Eidson	12/1/07	12/1/07	
Project Training	Teddy Ambrose	12/15/07	12/15/07	
QAPP Approval	Ben Buchanan	12/15/07	12/31/07	
Sampling	Reg 5 Field Investigators	1/7/08	1/6/09	First Tuesday of each month.
Lab Cert Audit of Aiken Lab	OQA	2/14/08	3/14/08	Tentative date.
Data Verification	Region 5 Lab, ARESD, and Tabatha Corley	As samples are completed	Within 2 weeks of the last sample report	
Final Lab Report	ARESD	NA	4/1/09	
Data Validation	Bill McDermott	As soon as Verification is complete	6/1/09	
Final Report on Region 5 portion	Tabatha Corley	7/1/09	8/1/09	

Table 2 Project Schedule

Comment [NB1]: Notice that this agrees with the requirement that a Class 4 QAPP be a year or less in duration. Duration of the project only concerns sampling, not the final report and not the preliminary investigation prior to sampling.

The dates shown in the table above are estimates only. Because weather can impact the results of the data, it is important that sample be collected in both dry weather and wet weather. Wet weather or rain events are defined as rainfall that exceeds 0.10 inches. Sampling events may be delayed in the cases of serious droughts or rain events exceeding 2 inches. Emergencies in the Region may also delay sampling events.

A7 Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs)

Comment: Since we are using DHEC personnel to collect samples and analyze them the QC involved with field and lab instruments is already documented in the appropriate Manuals and these are cited. However, a schedule for field duplicates is not included in the SOPs and should be given here—which it is---along with the acceptable range.

All Measurement Criteria of QC performed in the Laboratory and in the Field will meet requirements as listed in the SOPs. For field collection and analysis the SOPs are located in the EQC Environmental Investigations SOP&QA Manual, 2006 Edition. DQIs for Chemistry analyses will be found in "Procedures and Quality Control Manual for Chemistry Laboratories", and for Microbiological Samples "Laboratory Procedures Manual for Environmental Microbiology". In addition all field duplicate precision measurements for metals, and inorganic parameters must be within 30% RPD. Representativeness is a great concern and the experiment design and the visual reconnaissance should ensure that the non-points sources are identified properly.

A formal DQO process is not required for a Class 4 QAPP. All that is required is a statement of the project objectives or goals—which was stated previously—

The objective of this project is to identify problem areas as well as their probable sources and to bolster existing knowledge concerning the Edisto River Basin's ambient water quality baseline.

A8 Training

Comment: Only list specialty training—not normally given to Staff.

Specialized training for this project will include GPS measurements as well as downloading STORET data. Training will be documented through each Regional Office's Training Coordinator.

A9 Documentation and Records- Not required for a Class 4

Section B Measurement/Data Acquisition

B1 – B7 Sampling and Analysis Design and Requirements

In December of 2007, EQC Region 5 Lab performed visual reconnaissance of the Project's Geographical Area. This reconnaissance included a walk of the River to sight out possible NPS. Items that were of interest included facilities, poultry enclosures, dog pens, etc.

In addition, the stream collectors listed out items they have noticed during routine sampling that may have implication for stream impairment. During this pre-sampling period, screen samples were taken in order to determine the final sampling site. As result of these activities the following sites were chosen for this study. From this survey, 10 possible sources of impairment were noted. For each source sampling sites were designated above the source, at the source, and below the source. For those sites that were close (within 50 yards) to already established sites, the established site was used. The sites at the sampling source were named using sequential numbers 1-10. The upstream sites were named with the number used at the source site plus the letter U (for upstream). Likewise the downstream sites had the letter "D" added. Thus the site at source 7 was named 7, upstream is 7U, and downstream is 7D. Samples will be identified with the site name and the sampling date. Because the Water Quality Standards are given according to how the water body is used, the usage was noted and will be included in the final report.

Comment [NB2]: This is just an example to illustrate that a rational for naming the sampling sites and the samples must be documented.

If a sampling site becomes inaccessible, then sampling at that site will be delayed. If the inaccessibility will last for more than two weeks, a new nearby site will be located. This site must be sampled along with the original sample (when the site become accessible) for the rest of the project. If no site can be located, the remaining sites will be included in the study without the inaccessible site.

Sampling will begin 1/7/08 and end on 1/6/09. Sampling will be done as per the EEISOP and will take place on the first Tuesday of each month. One water sample will be taken from each site. For each sampling event a single duplicate will be collected at one of the sites All samples will be transported to the laboratory in order to meet required holding times.

The duplicate location will rotate through the sites so that a duplicate is collected at each site at least once. Duplicates will be taken by collecting a large sample and aliquoting into two containers. There will be duplicate samples for fecals. These will be done with the single 200 ml

Comment [NB3]: For some projects it may be more valid to collect two separate samples at the same time, or one after the other. It is important to make sure everyone is collecting duplicates in the same manner and so the way in which duplicates will be collected should be stated in the QAPP. This method must agree with the protocols as stated in the EEISOP.

sterile bottle used to collect the sample. Samples will be well shaken and then aliquoted aseptically into two 100 ml sterile bottles. Because of the nature of fecal samples the precision data is for informational purposes only.

All sample collection, field analysis, handling, preservation, and chain of custody will be done as described in the EEISOP. All sample analysis and quality control for chemical analyses will be done according to the ARESD Procedures and QC Manual for Chemistry Laboratories. All microbiological analysis and QC will be done according to the ARESD Procedures Manual for Environmental Microbiology.

It is important to obtain at least 75% valid data from this project. If this is not achieved at the end of the expected sampling date, then the sampling will be extended in order to obtain 75% valid data. If problems occur with broken samples or invalid samples due to temperature on receipt, the hold time was exceeded or other problems, Ms. Corley will determine any needed corrective action and if resampling is needed. This corrective action and the result of these actions will be documented on a project corrective action form located on the EQC Region 5 Server.

Analyte	PQL	Lab	Turnaround Time
Temperature	**	Reg 5	Immediate
pH	**	Reg 5	Immediate
DO	**	Reg 5	Immediate
Turbidity	1 NTU	Reg 5	1 week
BOD	2 mg/L	Reg 5	2 weeks
Ammonia	50 ug/L	ARESD	4-6 weeks
Nitrate/Nitrite	20 ug/L	ARESD	4-6 weeks
TKN	100 ug/L	ARESD	4-6 weeks
Total Phosphorus	20 ug/L	ARESD	4-6 weeks
Fecal Coliforms by A-1	2 MPN units/100 ml	ARESD	1 week
Alkalinity	1 mg/L	ARESD	4-6 weeks
Total Organic Carbon (TOC)	200 ug/L	ARESD	4-6 weeks
Cadmium (Cd)	10 ug/L	ARESD	4-6 weeks
Chromium (Cr)	10 ug/L	ARESD	4-6 weeks
Copper (Cu)	10 ug/L	ARESD	4-6 weeks
Iron (Fe)	20 ug/L	ARESD	4-6 weeks
Lead (Pb)	50 ug/L	ARESD	4-6 weeks
Manganese (Mn)	10 ug/L	ARESD	4-6 weeks
Nickel (Ni)	20 ug/L	ARESD	4-6 weeks
Zinc (Zn)	10 ug/L	ARESD	4-6 weeks
Mercury (Hg)	0.20 ug/L	ARESD	4-6 weeks

Table 3 Example Analytical Methods Table –Not required for a Class 4 QAPP, but see comment below.

Comment: Table 3 IS NOT required for a Class 4 QAPP, but the writer is reminded that they must check to make sure that the sensitivity of the analysis that will be used by the Lab is sensitive enough for the project. Thus, this Table is left in this example as a reminder.

B9 Data Acquisition Requirements (Non-Direct Measurements) – only if applicable for a Class 4 QAPP.

Comments: Any data that is not directly produced by this project are non-direct measurements—this includes modeling. Include what you are using and justify its inclusion. The data used must be of known quality.

The data obtained from the study will be compared to historical data. Because the historical data was analyzed by the same laboratories and, for the most part, by the same methodology; it is directly comparable to the study data. In addition, meteorological data will be used (obtained from the National Weather) to correlate data with precipitation amounts.

B10 Data Management

Not required for a Class 4 QAPP.

Section C Assessment and Oversight

Not required for a Class 4 QAPP,

Section D Data Validation and Usability

D1 Data Review, Verification and Validation –

Not required for a Class 4 QAPP.

D2 Validation and Verification Methods

The process for verifying and validating the data is as follows:

Comments: This is just an example. The way staff will verify must be discussed and agreed upon. The way validation will be done must be worked out with the Validator. A reasonable discussion or list of steps showing how verification and validation will be done is all that is needed here. It is NOT advised that staff who are producing data be selected as the data validator.

Verification:

Verification is done as per the ARESD Laboratory Manuals. Verification by Region 5 (Tabatha Corley) will consist only of a completeness check. This check will ensure that all sample data was received. It will note if the goal of 75% data validity was achieved. If not, Ms Corley will determine the number of samples required to achieve 75% valid data. Those samples will be collected by extending the sampling period at all sites. Ms. Corley will notify staff on the distribution list that sampling will be extended and for how long. Verification will also include an overlook of field data to make sure documentation was complete. Any problems will be noted in an email to Mr. McDermott who will validate the data.

Validation:

Mr. McDermott will note the problems seen by the verifier. He will then examine the data and ensure that sample results match what was expected at the site--for example: that the upstream sites have lower concentrations of the analytes than at the source or downstream from the source. He will compare the data against historical data and determine if the data agrees with the project data. After these assessments, the Validator researches the data and/or documentation that are inconsistent. This is done by contacting Lab and Field Personnel to try and correct and/or explain inconsistencies. After all of the Validation steps have been completed, the Validator submits a report to the Project Manager who will include this report as appendix to the final report.